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Title

Digital textile printer

Field of the Invention

The present invention relates to a digital textile printer, and more particularly a printer performing effectively not only general printing operations to a little thick printing material (textile fabrics or papers), such as a banner, a advertising material, or a photograph, but also textile printing operations to the very thin printing material, such as textile fabrics.

Description of the Related Art

Generally, in the conventional printer utilizing a technique of subtractive mixture, a digital controller sends digitalized signals to a head of the printer, so that the head may inject proper amounts of ink of three primary colors comprising magenta, yellow, and cyan, and of a black color to a printing material to produce various color tones. Therefore, the latest printer makes it possible for a user

to design more easily what she/he wants.

In the technique of subtractive mixture, the head of the printer equips several ink reservoirs, while each ink reservoir contains one color respectively. The head injects proper amounts of ink from each reservoir to produce a new color tone. The head often equips another ink reservoir containing special color to produce a new color tone, if necessary.

By referencing Fig. 1 and Fig. 2, the conventional digital printer will be described briefly in the following statements.

The conventional printer equips a transfer belt 5 with a rail shape on the top of a base 3, while the base 3 is supported by both legs 1 contacting with the ground. The one side of a cartridge 9 is fixed with the transfer belt 5, so that a head 7 of the cartridge 9 can be moved through the transfer belt 5. In more, a transfer axis 50 is connected with a transfer motor (not shown) within a driving panel 18 installed in the one side of the inner upper side of the base 3. Additionally, lots of transfer rollers 51 on the transfer axis 50 are extruded on the top of the base 3 to make a printing material 17 move to the forward direction, while a press roller 40 equipped

correspondingly on the top of each transfer roller 51 presses the printing material 17 to the downward direction.

In more, a feeding roller 11 installed in the rear side of the digital printer supplies the printing material 17 to the top of the base 3. When the cartridge 9 moves reciprocally to the left or the right direction on the top of the printing material 17, the head 7 moving in combination with the cartridge 9 injects predetermined amounts of each color from the corresponding ink reservoir to perform printing operations. As a result, the printed material is recoiled in a rewinding roller 12 located on the opposite side of the feeding roller 11.

An operation panel 16 covered by a cover 15 is equipped on the top of the base 3. Therefore, a user can input any desirable signal to be printed in the printing material 17.

In other words, as shown in Fig. 2, the printing material 17 is suspended to the feeding roller 11 in the rear of a fixing frame 10 between the legs 1, and the end of the printing material 17 passes through the top of the base 3 supported by the legs 1. In more, the rewinding roller 12 winding the printing material 17 printed at the base 3 is in the front of the fixing frame 10.

However, the conventional printer described in the above statements has the following problems. After the printing material 17 is put between lots of transfer rollers 51 and press rollers 40, the transfer roller 51 rotates to make the printing material 17 move to the front side of the base 3. When the printing material 17 is extremely thin in the case of textile printing, the speed of the printing material 17 passing through between the transfer rollers 51 and the press rollers 40 is different from that of the printing material 17 before the transfer roller 51. Therefore, a portion of the printing material 17 is often wrinkled, and the wrinkled moving printing material 17 has a tendency of inclining toward one direction only. As a result, when the printing material 17 is distorted or wrinkled, printing colors are overlapped to get high fraction defective of the printing operations.

Additionally, the conventional digital printer does not have a feeding means drawing and rewinding the printing material 17 in constant speed to maintain the printing material 17 in plain. Therefore, the distortion or the wrinkle of the printing material 17 is deepened more to increase fraction defective of the printing operation.

Detailed Description of the Invention

To overcome the above described problems, the present invention provides a digital textile printer comprising the front rewinding and the rear feeding devices, at the front and the rear of the base, driven by a transfer axis in a driving panel, winding a printing material to a rewinding roller in a constant tension force, preventing defective printing operations generated by distorting or wrinkling phenomena of the printing material, and performing effective textile printing to the very thin textile fabrics eventually.

In more, the present invention provides a digital textile printer comprising a long ink-retrieving hole, on the top of the base, collecting the residues of the injected ink passing through the printing material to prevent the printing material from ink contamination or ink smearing.

In more, the present invention provides a digital textile printer comprising a heater of rubber material, in the inside of the front of the base, drying promptly the printing material passing through the ink-retrieving hole.

To achieve the above described purpose, the present

invention discloses a digital textile printer with a transfer belt with a rail shape on the top of the base supported by both legs contacted with the ground, a cartridge transferable through the transfer belt and fixing a head unit at the one side of the cartridge, a transfer axis with a long shape coupled with a transfer motor in a driving panel installed on the top of the inside of a base, multiple transfer rollers of the transfer axis protruding to the top of the base to make a printing material move to the forward direction, a feeding roller means installed in the rear of the base sending the printing material through the top of the base, a rewinding roller means rewinding the printing material from the top of the base, comprising: at least one rear guiding roller means at the rear of the base, coupled with the transfer axis; a rear feeding device including a rear tension means at the bottom of the rear of the legs to rotate eccentrically in a predetermined angle, a rear position sensor installed at a predetermined position of the rear tension means to correspond to a rear eccentric axis of the rear tension means winding the printing material, and a feeding motor installed on the top of the rear tension means to drive a rear bobbin axis of the feeding roller means combined with a rear bobbin

feeding the printing material by receiving signals from the rear position sensor; at least one front guiding roller means at the front of the base, linked with the transfer axis; and a front rewinding device including a front tension means at the bottom of the front of the legs to rotate eccentrically in a predetermined angle, a front position sensor installed at a predetermined position of the front tension means to correspond to a front eccentric axis of the front tension means winding the printing material, and a rewinding motor installed on the top of the front tension means to drive a front bobbin axis of the rewinding roller means combined with a front bobbin rewinding the printing material by receiving signals from the front position sensor.

In more, the front tension means installed at the front of the bottom of the legs, comprises: front fixtures facing each other at the front of two legs; a front rotation axis installed eccentrically between two front brackets with a predetermined length, penetrating two front brackets, and both ends of the front rotation axis combined with the front fixtures; and a front eccentric axis, corresponding to the printing material, apart in a

predetermined distance from the front rotation axis between the two front brackets.

In more, the rear tension means installed at the rear of the bottom of the legs, comprises: rear fixtures facing each other at the rear of two legs; a rear rotation axis installed eccentrically between two rear brackets with a predetermined length, penetrating two rear brackets, and both ends of the rear rotation axis combined with the rear fixtures; and a rear eccentric axis, corresponding to the printing material, apart in a predetermined distance from the rear rotation axis between the two rear brackets.

In more, the front guiding roller means further comprises multiple front rollers coupled with the transfer belt of the transfer axis and combined with at least one front tension axis.

In more, the rear guiding roller means further comprises multiple rear rollers coupled with the transfer belt of the transfer axis and combined with at least one rear tension axis.

In more, the diameter of the front roller of the front guiding roller means linked directly with the transfer axis is slightly larger than the diameter of the rear roller of the rear guiding roller means.

In more, the digital textile printer further comprises an ink-retrieving hole in a long shape on the top of the base to collect the residues of the injected ink passing though the printing material.

In more, the digital textile printer further comprises a heater of rubber material at the inside of the base to dry promptly the printing material.

In more, the digital textile printer according to claim 1, further comprises: multiple front adjusting holes between the two front brackets; and a front tension adjusting axis installed in one of the multiple front adjusting holes to balanc with the weight of the front eccentric axis, and eventually to adjust tension strength of the front eccentric axis.

In more, the digital textile printer according to claim 1, further comprises: multiple rear adjusting holes between the two rear brackets; and a tension rear adjusting axis installed in one of the multiple rear adjusting holes to balanc with the weight of the rear eccentric axis, and eventually to adjust tension strength of the rear eccentric axis.

Brief Description of the Drawings

For a more complete understanding of the present invention and the advantages thereof, reference is now made to the following descriptions taken in conjunction with the accompanying drawings, in which like reference numerals denote like parts, and in which:

Fig. 1 is a perspective view of the conventional printer;

Fig. 2 is a schema of the transferring states of a printing material of Fig. 1;

Fig. 3 is a perspective view of the front of a digital textile printer of the present invention;

Fig. 4 is a cross sectional view of the main part of the digital textile printer through the line A-A according to the present invention;

Fig. 5 is a perspective view of the rear of the digital textile printer of the present invention;

Fig. 6 is a perspective view of the main part of a guiding roller means of the present invention; and

Fig. 7 is a schema describing the printing states of a printing material according to the present invention.

Embodiment

Reference will now be made in detail to preferred embodiments of the present invention, example of which is illustrated in the accompanying drawings.

According to the present invention, Fig. 2 is a partial sectional schematic diagram of an automatic ink supply device, and Fig. 3 is a cross sectional view of the automatic ink supply device. In more, Fig. 5 is a front view of a printer and the automatic ink supply device.

At first, a main body 100 installed adjacently to a printer 500, has a rectangle shape and comprises a long opening 110 horizontally in the front side of the main body 100. Preferably, the front side of the main bode except the opening 110 is covered with transparent material, such as acryl. In more, the top side of the main body 100 comprises a body cover 120 opened or closed by rear hinge 120.

Additionally, in a predetermined height of the inside of the main body 100, the main body 100 comprises a bottom supporting plate 130 and a top supporting plate 140 including multiple supporting holes 131 and 141.

In more, multiple bottom tanks 200 penetrates each supporting hole 131 of the bottom supporting plate 130, and

the bottom side of the multiple bottom tanks 200 is grounded to the bottom side of the main body 100. Each of the multiple bottom tanks 200 charged by color ink in a predetermined height, while the color inks are different from one another, has a cylindrical shape and a close cap 210 at the top side.

A hose hole 220 with a predetermined diameter is generated in the center of the close cap 210. In more, the length of a nozzle hose 230 installed in the one side of the close cap 220 is as long as from the bottom of the inner side of each of the multiple bottom tanks 200 to the printer 500 adjacent to the main body 100. Additionally, in the end of each of the nozzle hoses 230, each of the nozzles 240 connected to the printer 500 is installed.

The six bottom tanks 200 are usually installed, and each of the bottom tanks 200 contains color ink, such as cyan, yellow, magenta, black, light magenta, and light cyan, or specially selected color ink can be charged to the bottom tank 200. Therefore, combination of those colors can discharge various colors.

As shown in Fig. 2, in the case of connecting the end of the nozzle hose 230 with the nozzle 240 connected with the printer 500, a nozzle cartridge 250 having a same shape

of the ink cartridge is generated. Sequentially, an installation groove 251 is generated in a nozzle cartridge 250 to fix the nozzle hose 230 in stable, and the one end of the nozzle cartridge 250 fixes the nozzle 240. In more, the nozzle hose 230 installed in the nozzle cartridge 250 can be set in the inside of the nozzle cartridge 250.

Each of six top tanks 300 corresponding to the same number of the bottom tanks 200 is installed in and penetrated into each of the supporting holes 141 of the top supporting plate 140, and is supplied by ink having different colors one another. In more, a supply hose 310 with an O/C(open/close) valve 320 is connected with the bottom of the top tank 300, and the bottom end of the supply hose 310 is prolonged to a predetermined height of the inside of the bottom tank 200 to maintain the amount of ink constantly, as shown in Fig. 4. Additionally, the top side of the top tank 300 comprises an O/C cover 330 receiving ink from the outside. The O/C valve 320 is exposed to the opening 110 in the front side of the main body 100 so that the O/C valve 320 can be controlled from the outside.

In more, the supply hose 310 positioned in the inside of the top tank 300 comprises a filter unit 340 filtering a

foreign substance within the injected ink. The filter unit 340 has a minute size (about 10) to prevent a water passage, and the ink is slowly passed by the surface tension and is supplied into the bottom tank 200.

On the contrary, in the bottom of the main body 100, a supporting rod 400 adjusting the height to fit on the height of the printer 500 is installed in a predetermined distance apart. The supporting rod 400 comprises two top supporting rods 410 in the bottom of the main body 100 in a distance, and a bottom supporting rod 420 is prepared and guided into the inside of each of the top supporting rods 410. In more, with the bottom side of the bottom supporting rod 420, a base plate 430 supporting the bottom supporting rod 420 in stable is connected.

Additionally, the one side of the two top supporting rods 410 comprises a fixing bolt 411, corresponding to the bottom supporting rod 420, to combine two supporting rod 410 and 420 in stable, and the base plate 430 comprises multiple casters 440 moving the main body 100 conveniently and easily.

In more, an elevating mean 450 lifting up and down the main body is installed between the supporting rods 400. The elevating mean 450 comprises a screw rod 451, a screw

axis 453, and an adjusting handle 454. The screw rod 451 is placed in the center of the bottom of the main body 100 and the screw axis 453 is placed in the center of the base plate 430 rotating in the inside of the screw rod 451 in a fixed position to lift up and down the screw rod 451. In more, the adjusting handle 454 makes the rotation of the screw axis 453 easy. In other words, when the adjusting handle 454 is rotated, the screw axis 453 is rotated in a fixed position to lift up and down the screw rod 451, and the top supporting rod 410 is lifted up and down in stable from the bottom supporting rod 420 placed in both sides of the base plate 430.

Function and effects of the automatic ink supply device shown in the above will be described in the following statements.

At first, the automatic ink supply device is moved to the one side of the printer 500. In this case, the automatic ink supply device is moved easily because the caster 440 is installed in the bottom side of the base plate 430.

After moving the automatic ink supply device to the one side of the printer 500, the nozzle cartridge 250 combined with the nozzle hose 230 is installed in the

cartridge chamber (not shown) in the one side of the printer 500, and the height of the main body 100 is adjusted. It is because ink supply to the printer is not performed well when the height of the main body 100 is less than that of printer 500.

To adjust the height of the main body 100, the fixing bolt 411 of the one side of the top supporting rod 410 is loosed to release the end of the fixing bolt 411 from the bottom supporting rod 420. Sequentially, the adjusting handle 454 is rotated in the one direction to rotate the screw axis 453 in a fixed position. In this case, the screw rod 451 and both top supporting rods 410 are lifted up due to the rotation of the screw axis 453. In more, the top side of the main body 100 is also lifted up adequately to match on the height of the printer 500. After adjusting the height of the main body 100, the fixing bolt 411 of the one side of the top supporting rod 410 is tightened to contact the end of the fixing bolt 411 with the bottom supporting rod 410 and to prevent the lift-up main body 100 from moving.

After adjusting the height of the main body 100 adequately, the body cover 120 installed in the top side of the main body 100 is opened. In this case, the body cover

120 is opened and supported by the rear hinge 121.

When the body cover 120 is opened, the O/C cover 330 of the top tank 300, normally six arranged inline, is opened and each of the top tanks 300 is charged with different color inks one another, such as cyan, yellow, magenta, black, light magenta, and light cyan.

The ink charged in the inside of the top tank 300 is supplied to the bottom tank 200 through the supply hose 310 by the surface tension. In this case, the open states of the O/C valve 320 installed in the supply hose 310 are maintained. Because the filter unit 340 is installed in the supply hose 310 placed in the inside of the top tank 300, a foreign substance within the ink or a lump of ink larger than a standard size (about 10) is filtered to prevent closing of the nozzle 240 during the printing process.

As shown in Fig. 4, an atmospheric pressure is exerted to the ink supplied from the bottom tank 200 through the supply hose 310 prolonged to the inside of the bottom tank 200. Therefore, the height of the ink within the bottom tank 200 is maintained constantly, and the amount of the ink consumed in the bottom tank 200 is refilled from the top tank 300.

When the ink of the top tank 300 is consumed

completely, the O/C valve 320 installed in the supply hose 310 is closed through the opening 110 in the front side of the main body 100, and adequate amount of ink is refilled to the top tank 300. Sequentially, the O/C valve 320 is opened again. When ink is refilled to the top tank 300 in the state of opening the O/C value 320, the difference of an atmospheric pressure is generated in the inside of the bottom tank 200. Therefore, such phenomena rises up the ink level in the inside of the bottom tank 200, and makes the amount of discharged ink through the nozzle 240 different to generate low printing quality.

As shown in the above statements, the automatic ink supply device of the present invention provides has a minimized volume to be installed easily. In more, the top tank and the bottom tank can supply ink continuously, while the bottom tank is connected with each of the multiple nozzle hoses and the top tank is connected with the bottom tank through the supply hose. Therefore, printing efficiency is maximized and supplying ink from the outside is performed easily.

Additionally, the height of the automatic ink supply device of the present invention can be adjusted in free to match on any height of the printer. In more, the filter

unit installed in the inside of the top tank charged by ink from the outside filters a foreign substance or a lump of ink larger than a standard size to prevent closing of the nozzle to ensure high printing quality.

While the invention has been particularly shown and described with reference to preferred embodiments thereof, it will be understood by those skilled in the art that the foregoing and other changes in form and details may be made therein without departing from the spirit and scope of the invention.

What is claimed is:

1. A digital textile printer with a transfer belt with a rail shape on the top of the base supported by both legs contacted with the ground, a cartridge transferable through the transfer belt and fixing a head unit at the one side of the cartridge, a transfer axis with a long shape coupled with a transfer motor in a driving panel installed on the top of the inside of a base, multiple transfer rollers of the transfer axis protruding to the top of the base to make a printing material move to the forward direction, a feeding roller means installed in the rear of the base sending the printing material through the top of the base, a rewinding roller means rewinding the printing material from the top of the base, comprising:

at least one rear guiding roller means at the rear of the base, coupled with the transfer axis;

a rear feeding device including a rear tension means at the bottom of the rear of the legs to rotate eccentrically in a predetermined angle, a rear position sensor installed at a predetermined position of the rear tension means to correspond to a rear eccentric axis of the rear tension means winding the printing material, and a feeding motor installed on the top of the rear tension

means to drive a rear bobbin axis of the feeding roller means combined with a rear bobbin feeding the printing material by receiving signals from the rear position sensor;

at least one front guiding roller means at the front of the base, linked with the transfer axis; and

a front rewinding device including a front tension means at the bottom of the front of the legs to rotate eccentrically in a predetermined angle, a front position sensor installed at a predetermined position of the front tension means to correspond to a front eccentric axis of the front tension means winding the printing material, and a rewinding motor installed on the top of the front tension means to drive a front bobbin axis of the rewinding roller means combined with a front bobbin rewinding the printing material by receiving signals from the front position sensor.

2. The digital textile printer according to claim 1, wherein the front/rear tension means installed at the front/rear of the bottom of the legs, comprises:

front/rear fixtures facing each other at the front of two legs;

a front/rear rotation axis installed eccentrically between two front/rear brackets with a predetermined length, penetrating two front/rear brackets, and both ends of the front/rear rotation axis combined with the front/rear fixtures; and

a front/rear eccentric axis, corresponding to the printing material, apart in a predetermined distance from the front/rear rotation axis between the two front/rear brackets.

3. The digital textile printer according to claim 1, wherein the front/rear guiding roller means further comprises multiple front/rear rollers coupled with the transfer belt of the transfer axis and combined with at least one front/rear tension axis.

4. The digital textile printer according to claim 1, wherein the diameter of the front roller of the front guiding roller means linked directly with the transfer axis is slightly larger than the diameter of the rear roller of the rear guiding roller means.

5. The digital textile printer according to claim 1, further comprises an ink-retrieving hole in a long shape on the top of the base to collect the residues of the injected ink passing though the printing material.

6. The digital textile printer according to claim 1, further comprises a heater of rubber material at the inside of the base to dry promptly the printing material.

7. The digital textile printer according to claim 1, further comprises:

multiple front/rear adjusting holes between the two front/rear brackets; and

a front/rear tension adjusting axis installed in one of the multiple front/rear adjusting holes to balanc with the weight of the front/rear eccentric axis, and eventually to adjust tension strength of the front/rear eccentric axis.

ABSTRACT OF THE DISCLOSURE

The present invention discloses a digital textile printer including a front and a rear feeding devices driven by a transfer axis within a driving panel of the front and the rear of a base to prevent distortion and wrinkle phenomena generating defective printing to perform effectively the textile printing even to the very thin textile fabrics, an ink-retrieving hole along to the transfer axis on the top of the base to collect the residues of the injected ink passing through a printing material to prevent ink from spreading at the printing material, at least one suction pan in the inside of the base to collect easily the residues of the injected ink to hasten dries of ink, and a heater of rubber material in the inside of the front of the base to hasten dries of the printing material passing through the ink-retrieving hole.